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Adam Pilny[1]

Explaining Differentials in Subsidy Levels among Hospital Ownership Types in Germany

Abstract

German hospitals receive subsidies for investment costs by federal states. Theoretically, these subsidies have to cover the whole investment volume, but in fact only 50%-60% are covered. Balance sheet data show that public hospitals exhibit higher levels of subsidies compared to for-profit hospitals. In this study, I examine the sources of this disparity by decomposing the differential in a so-called facilitation ratio, i.e. the ratio of subsidies to tangible fixed assets, revealing to which extent assets are funded by subsidies. The question of interest is, whether the differential can be attributed to observable hospital-specific and federal state-specific characteristics or unobservable factors.

JEL Classification: H25, I11, L33

Keywords: Hospitals; subsidies; ownership; Blinder-Oaxaca decomposition

November 2014

1 Adam Pilny, RWI, RGS Econ and Ruhr-Universität Bochum. – *The author thanks Boris Augurzky, Thomas K. Bauer, Dörte Heger, Corinna Hentschker, Martin Karlsson and Sandra Schaffner for helpful comments and suggestions. Financial support by the Ruhr Graduate School in Economics is gratefully acknowledged. –* *All correspondence to: Adam Pilny, RWI, Hohenzollernstr. 1-3, 45128 Essen, Germany, e-mail: adam.pilny@rwi-essen.de*

1 Introduction

According to the *Hospital Financing Act* (KHG) from 1972, a dualistic system is applied to ensure the financing of German hospitals. The fundamental idea is the separated financing of running costs and investment costs. Running costs are reimbursed by statutory and private health insurances, while expenditures for capital, i.e. investments in buildings and new equipment, have to be financed by the federal states. This dualistic system is justified with the responsibility of the federal states to ensure a sufficient provision of in-patient health care, especially in structural weak areas (Coenen et al., 2012). This provision has to be warranted by efficient and independently operating hospitals (§1 KHG).

According to the law, there should be no difference in the granting of investment subsidies among hospitals in public, private not-for-profit (PNFP) and private for-profit (PFP) ownership. Thus, the legal form of a hospital company should not affect the granting of subsidies (DKG, 2014). In fact, there are substantial differences in subsidy shares in the balance sheets among ownership types. Publicly owned hospitals exhibit a higher level of subsidies, while privately owned hospitals receive fewer subsidies.

In this paper, I examine the sources of differentials in subsidy levels between ownership types. The question of interest is to which extent such differentials can be attributed to differences in observable characteristics related to hospitals and federal states or to unobservable factors. This issue has high policy relevance, since policy makers may have an interest whether hospitals with poor financial conditions are facilitated via subsidies.

A substantial problem in the hospital market is the undercapitalization of hospitals (Augurzky et al., 2014). Subsidies represent an important component of the capital stock of hospitals. Due to the debt brake of the federal states, a continual level of granted subsidies cannot be guaranteed in the long run. Thus, hospitals are obliged to fill this gap with either equity capital or debt capital. Coenen et al. (2012) argue that the current form of investment subsidies constrains the entrepreneurial behavior of hospitals, even though this is essential for competitive markets. Subsidies may preserve inefficient structures in the market, i.e. by artificially keeping alive *de facto* bankrupt hospitals or by avoiding the strengthening of out-patient services as a substitute for particular in-patient services.

Until now, to my knowledge, no study exists investigating the sources of the differential in subsidy levels among ownership types. Previous studies examining differences between ownership types of German hospitals focus predominantly on the financial sustainability, cost and profit efficiency or the responsiveness to changes in demand for hospital services (see e.g. Augurzky et al. 2012; Schwierz 2011; Herr et al. 2011; Herr 2008).

The paper is organized as follows: Section 2 outlines the institutional background of subsidies in the German hospital market. An overview of the data and descriptive statistics are provided in Section 3. Section 4 presents the model and explains the decomposition technique. Results are discussed in Section 5. Section 6 concludes.

2 Institutional background

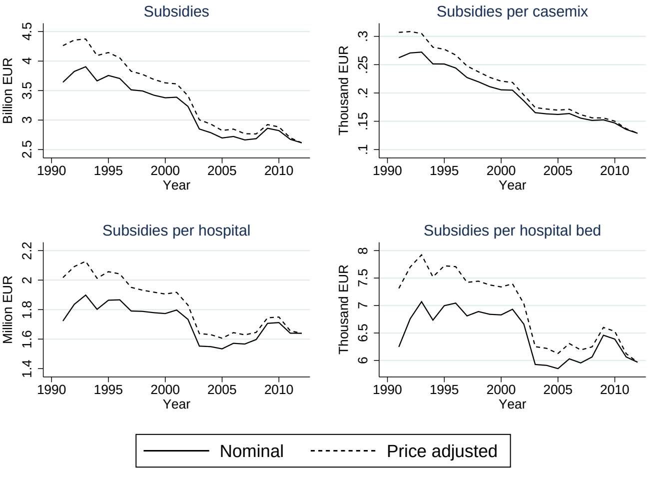
The KHG constitutes the framework for investment subsidies for German hospitals. To fill this framework with content, each federal state assembles a hospital plan and investment programs to schedule the allocation of investment subsidies (§6 KHG). For that, federal state-specific hospital financing acts exist. Only hospitals affiliated in the hospital plans of the federal states are eligible for investment subsidies.[1] The purpose of use of investment subsidies is exactly defined. Investment payments are bound to the formation of new hospital buildings and the acquisition of hospital-specific economic goods like medical-technical equipment, excluding expendable goods. Furthermore, they should cover the costs for restocking goods belonging to the capital assets. Subsidies are paid as an individual or as a lump-sum funding. For an individual funding an application by the hospital is necessary. Individual funding covers costs for new buildings and the acquisition of medical-technical equipment with an average economic useful life of more than three years.[2] The acquisition of short-term economic goods and small building works are financed via annual lump-sum subsidies, whose amount is regularly adjusted to the development of the costs. Within this granting regime, the risk of investments is not necessarily covered by the actual number of cases. In 2009, the financing scheme of investment costs has been modified with the *Reformed Hospital Financing Act* (KHRG), introducing a new option of performance-oriented lump-sum subsidy payments starting in 2012. However, the federal states can decide whether they want to grant subsidies performance-oriented or stay with the established granting regime. Coenen et al. (2012) criticize the availability of this option, since this regime distorts competition between in-patient and out-patient services, the hospitals' choice of the optimal combination of labor and capital, and weakens the competition between hospitals.

Ideally, the volume for investments should be financed towards 100% via subsidies, but in fact this magnitude is not reached. Actually, about 50% to 60% of investment expenditures are financed by the federal states. The gap in these investment expenditures has to be paid by the hospitals on their own (Augurzky et al., 2010). Because federal states are obligated to consolidate their balances, medium-term reliefs for hospitals cannot be guaranteed (Lauterbach et al., 2009). In 1991, the share of KHG subsidies to the hospitals' total revenue amounted to 10%, while this share decreased considerably to 3.6% in 2012 (Augurzky et al., 2014). The volume of price-

[1] In 2012, 69.0% of all hospitals or, in terms of beds, 80.4% of the total hospital market were affiliated in the hospital plans of the federal states (Statistisches Bundesamt, 2013).

[2] Other subjects can also be financed by individual funding, e.g. costs for the re-organization of particular facilities of a hospital or costs for the closure of a hospital.

Figure 1: Volume of granted subsidies



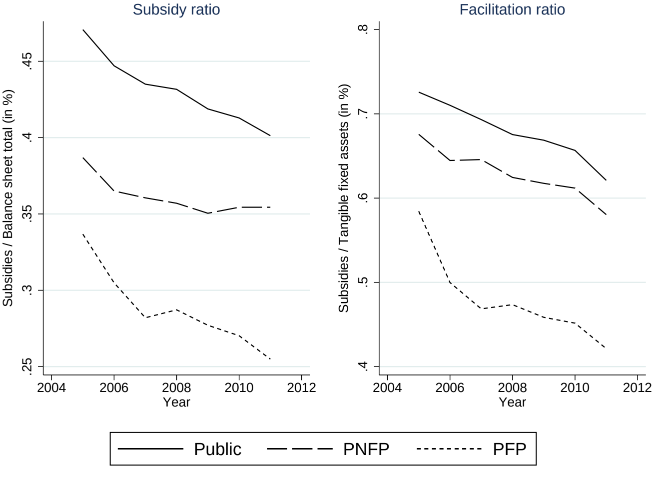
Source: DKG, Statistisches Bundesamt, WIdO. Own calculation.
Notes: Subsidies paid by federal states according to the KHG are displayed at nominal and at price adjusted values. Values are price adjusted by the price index for capital goods (2012=100).

adjusted subsidies to hospitals decreased by 38.7% (-2.3% p.a.) from EUR 4.3 billion in 1991 to EUR 2.6 billion in 2012, as shown in Figure 1. An even stronger decrease is documented in subsidies per casemix point with an annual decline by 4.1% (-58.0% in total) from EUR 307 in 1991 to EUR 129 in 2012. In 2009, subsidy payments slightly increased. This increase does not become apparent per casemix point, because the number of cases grew significantly stronger than the amount of paid subsidies. Other than per casemix point, the increase in subsidies in 2009 relaxed the downward tendency in terms of subsidies per hospital and per hospital bed. Due to a decreasing number of hospitals and their bed capacity, the remaining hospitals benefit from relatively higher subsidy payments between 2005 and 2010. However, the level of paid subsidies has continued to decrease since 2010. Moreover, a disparity in granted subsidies between West and East Germany is observable.[3] Until 2010, hospitals in East Germany received relatively more subsidies in terms of subsidies per bed, per hospital and per casemix point.

Granted subsidies are booked in the so-called *special items* in the balance sheet of a hospital. A hospital's balance sheet sum consists of equity capital, debt capital and special items, representing the total volume of the capital stock. Hospital-specific accounting rules have to be applied to ensure an accounting entry of subsidies resulting in neither profit nor loss (Havighorst, 2004).

[3]The disparity between West and East Germany is shown in Figure A1 in the Appendix.

Figure 2: Ownership-specific subsidy and facilitation ratios



Source: Dafne, Statistisches Bundesamt. Own calculation.

Thus, the reported capital appreciation should not be affected by subsidies. Special items include subsidies from three sources: subsidies from the federal states according to the KHG, grants by other public authorities not associated with the KHG and earmarked grants by third parties.

Figure 2 shows the development of subsidies related to the balance sheet total (*subsidy ratio*) and to tangible fixed assets (*facilitation ratio*). The figure on the left hand side presents the share of subsidies to the total capital stock of hospitals. The subsidy ratio decreased over all ownership types in the period 2005 to 2011. In 2005, about one half of the capital stock of public hospitals comprised subsidies. Even though this share decreased until 2011, public hospitals still rely on subsidies to a substantial magnitude with 40.1%. Among hospitals in PNFP ownership, the subsidy ratio decreased slightly from 38.7% in 2005 to 35.4% in 2011. PFP hospitals exhibit the largest decrease by 8.2%-points to 25.5% during this period. However, the purpose of granted subsidies is covering the costs for restocking tangible fixed assets (e.g. buildings, new equipment). The pure subsidy ratio does not reveal this issue *per se*, rather subsidies have to be related directly to tangible fixed assets. The ratio of subsidies to tangible fixed assets, a so-called *facilitation ratio*, shows to which extent assets are funded by subsidies. In 2005, all ownership types exhibit quite high facilitation ratios between 58.4% to 72.6%. Until 2011, the ratios decreased throughout. However, public (62.1%) and PNFP (58.0%) hospitals have higher facilitation ratios than PFP hospitals (42.1%). Even in the subsidy and facilitation ratio a disparity between hospitals in

West and East Germany exists, with higher subsidy and facilitation ratios in hospitals located in East Germany.[4] The residual in the investment expenditures has to be financed either by equity capital or debt capital. Usually, the absent capital has to be acquired via capital markets.

3 Data

The main data source used for the empirical analysis is the annually published hospital register by the German Statistical Office. The hospital register comprises about 95%-97% of all German hospitals.[5] Financial data are obtained from the Dafne database that provides information of balance sheets and profit and loss statements of German companies. The assignment of each hospital to the actual hospital chain has been made by the author. Data on regional characteristics are used from the Federal Office for Building and Regional Planning (BBSR). The sample is restricted on hospitals that are eligible for investment subsidies according to the KHG. Thus, university hospitals, military hospitals and hospitals with or without a medical service contract are excluded.[6] Furthermore, purely psychiatric hospitals and day hospitals are excluded from the sample. Finally, the sample includes general (acute care) hospitals affiliated in the hospital plan. The unit of observation is the single hospital. The sample covers 5,157 observations for the period 2005 to 2011, representing in total 968 hospitals or 676 hospital balance sheets, respectively. A balance sheet can cover more than only one hospital, since some balance sheets are available on the hospital company level. To ensure accurate standard errors, they will be clustered on the balance sheet level in the empirical analysis.

Descriptive statistics are provided in Table 1. The variable of interest is the *facilitation ratio*. Public hospitals exhibit a facilitation ratio of 67.5%, followed by hospitals in PNFP ownership with 62.4%. PFP hospitals have the lowest ratio with 45.9%. As mentioned in Section 2, reported special items cover three sources of grants. It is not possible to extract only subsidies according to the KHG from this variable. Thus, the facilitation ratio also covers grants by other public authorities not associated with the KHG and earmarked grants by third parties. However, since I am not able to distinguish between the three sources of funds, the facilitation ratio can be regarded as an appropriate measure of the general dependence on subsidies. Public hospitals can achieve additional grants from their owners, i.e. the community or the county. To capture this issue to some extent, a variable for the economic strength of a county, the lagged *GDP per capita*, will be included in the regression model. Counties with a higher GDP exhibit higher tax revenues and are expected to be more able to support their hospitals. It is reasonable to assume

[4] The subsidy and facilitation ratios for West and East Germany are provided in Figures A2 and A3 in the Appendix.

[5] Only hospitals that agreed to the publication of their data are included in the hospital register.

[6] To provide medical treatments for patients in the statutory health insurance, a hospital needs a medical service contract. Otherwise, treatments will not be covered by statutory health insurances. Hospitals without a medical service contract are e.g. purely plastic surgery clinics.

Table 1: Descriptive statistics

	All		Public		PNFP		PFP	
	Mean	St. D.	Mean	St. D.	Mean	St. D.	Mean	St. D.
Hospital variables								
Facilitation ratio	0.606	(0.212)	0.675	(0.189)	0.624	(0.203)	0.459	(0.190)
EBITDA margin$_{t-1}$	0.041	(0.047)	0.021	(0.034)	0.032	(0.034)	0.093	(0.051)
Public*	0.341	(0.474)	1.000	(0.000)	0.000	(0.000)	0.000	(0.000)
PNFP	0.443	(0.497)	0.000	(0.000)	1.000	(0.000)	0.000	(0.000)
PFP	0.216	(0.412)	0.000	(0.000)	0.000	(0.000)	1.000	(0.000)
Beds$_{t-1} \times 10^{-3}$	0.315	(0.243)	0.400	(0.297)	0.281	(0.176)	0.248	(0.226)
Chain member$_{t-1}$	0.717	(0.450)	0.651	(0.477)	0.734	(0.442)	0.789	(0.409)
Rural	0.130	(0.336)	0.190	(0.392)	0.065	(0.247)	0.168	(0.374)
GDP per capita$_{t-1} \times 10^{-4}$	2.884	(1.173)	2.738	(1.086)	2.990	(1.166)	2.896	(1.291)
Federal state variables								
Debt per capita$_{t-1} \times 10^{-4}$	0.608	(0.339)	0.517	(0.318)	0.695	(0.329)	0.574	(0.347)
Subsidies per hospital bed$_{t-1}$	0.658	(0.195)	0.689	(0.187)	0.597	(0.187)	0.733	(0.188)
Social Democratic government$_{t-1}$	0.197	(0.398)	0.154	(0.361)	0.248	(0.432)	0.159	(0.366)
East Germany	0.183	(0.386)	0.228	(0.420)	0.106	(0.309)	0.267	(0.443)
Year dummys								
2005*	0.061	(0.239)	0.089	(0.284)	0.057	(0.232)	0.024	(0.154)
2006	0.108	(0.311)	0.129	(0.335)	0.120	(0.325)	0.052	(0.222)
2007	0.158	(0.365)	0.153	(0.360)	0.164	(0.370)	0.155	(0.362)
2008	0.162	(0.369)	0.157	(0.364)	0.167	(0.373)	0.160	(0.367)
2009	0.178	(0.383)	0.168	(0.374)	0.174	(0.379)	0.203	(0.403)
2010	0.181	(0.385)	0.171	(0.376)	0.175	(0.380)	0.208	(0.406)
2011	0.152	(0.359)	0.134	(0.340)	0.144	(0.351)	0.197	(0.398)
Observations	5,157		1,759		2,282		1,116	
Hospitals	968		332		436		259	
Balance sheets	676		249		382		84	

Notes: *This category of the categorical variable is used as the base group in the regression model.

that PFP hospitals would fill their need of capital for new investments at capital markets rather than with grants by third parties.

In order to examine the influence of the profitability of a hospital on the facilitation ratio, the lagged *EBITDA margin* is included, representing the relation of EBITDA (earnings before interest, taxes, depreciation and amortization) to total revenues. The coefficient of this variable shall reveal in how far less profitable hospitals rely on subsidies. The means of the EBITDA margin show an inverse pattern compared to the facilitation ratio. The lower the facilitation ratio is, the higher the profitability of an ownership group in the previous year. Further hospital-specific characteristics are included in the regression equation with a lag of one year: the size in terms of beds, squared beds and an indicator for the membership in a hospital chain. To control for the population density a dummy variable for the location in a rural area is included.

Besides hospital characteristics, several federal state-specific variables are included. These variables shall control for differences in the solvency and in political factors between the federal states. Lagged information on both *debt per capita* and the paid amount of *subsidies per (general) hospital bed* are included in the regression equation. To capture political influences, a lagged indicator variable for a *Social Democratic government* is included, while a Christian Democratic government is used as the base category. Furthermore, I include a dummy variable for *East Germany* to control for the disparity between West and East Germany. Finally, year dummies are included to control for time trends.

4 Model

The facilitation ratio Y_{itd} from hospital i in year t is observed with the corresponding classification in ownership types $d = \{Public, PNFP, PFP\}$. Further characteristics varying over hospitals, federal states and time are also available. To avoid potential endogeneity concerns, the majority of hospital-specific and federal state-specific variables is included with a lag of one year. The facilitation ratio Y_{itd} is explained through the linear model

$$Y_{itd} = \alpha + X'_{itd}\beta_d + \epsilon_{itd} \tag{1}$$

with $E[Y_{itd}|X_{itd}] = X'_{itd}\beta_d$ and $E[\epsilon_{itd}] = 0$ for all d. The coefficients of the model can be estimated with ordinary least squares (OLS).

In order to determine to which extent differences in observable characteristics account for differentials in facilitation ratio means a counterfactual decomposition technique as proposed by Blinder (1973) and Oaxaca (1973), the so-called Blinder-Oaxaca decomposition, is applied. A general formulation of this decomposition technique is provided by Oaxaca and Ransom (1994).[7]

[7] Most applications of the Blinder-Oaxaca decomposition can be found in the labor market literature, where

The difference in facilitation ratio means between two groups of ownership types ($d = 0, 1$) is described as

$$\begin{aligned} R &= E(Y_{it1}) - E(Y_{it0}) \\ &= E(X_{it1})'\beta_1 - E(X_{it0})'\beta_0 \\ &= \underbrace{\{E(X_{it1}) - E(X_{it0})\}'\beta^*}_{\text{explained part}} + \underbrace{\{E(X_{it1})'(\beta_1 - \beta^*) + E(X_{it0})'(\beta^* - \beta_0)\}}_{\text{unexplained part}} \end{aligned} \tag{2}$$

with the reference vector β^* that is defined as a linear combination of both coefficient vectors

$$\beta^* = \Omega\beta_1 + (I - \Omega)\beta_0. \tag{3}$$

The differential R is decomposed in two parts on the right-hand side of Equation (2). The first term is the so-called explained part and can be attributed to differences in the endowments, i.e. observable characteristics. The second term of the decomposition, the so-called unexplained part, captures the part of the differential that is attributable to differences in coefficients and potential unobserved factors.

To estimate the decomposition terms, OLS estimates of the coefficient vectors $\hat{\beta}_d$ for β_d and ownership type-specific sample means $\overline{X}_d$ for $E(X_d)$ can be used. Therefore, for each group a separate linear regression model is estimated. Moreover, an estimate for the unknown reference vector β^* is needed, which implies determining the weighting matrix Ω. In the literature it has been widely discussed how Ω can be defined (see e.g. Cotton 1988; Neumark 1988; Reimers 1983). If one ownership type in the hospital market is "discriminated" against in the granting of subsidies, and there is no (positive) "discrimination" of the other ownership types, the weighting matrix is equal to the identity matrix, i.e. $\Omega = I$ with the consequence that $\beta^* = \beta_d$. In this specific case, the differences in observable characteristics either refer to the disadvantage of the ownership type with the lower level of subsidies or the advantage of the ownership type with the higher level of subsidies. Cotton (1988) points out that the undervaluation of one ownership type is associated with the overvaluation of the other. Instead of this unilateral valuation, Neumark (1988) recommends the estimation of a pooled model over both groups that are compared to each other. The estimated coefficients of the pooled model are then used as the reference coefficients, i.e.

$$\Omega = (X_1'X_1 + X_0'X_0)^{-1}X_1'X_1 \tag{4}$$

as shown by Oaxaca and Ransom (1994).[8] By using the pooled coefficient vector, the pooled model has to be augmented by a dummy variable indicating one of both groups. When the group-

this decomposition technique is used to explain wage differentials between genders, races or industries.

[8] An alternative approach for the specification of Ω is provided by Reimers (1983) who uses $\Omega = 0.5I$, i.e. the average of the coefficients over two groups. In contrast, Cotton (1988) weights the estimated coefficients by sample sizes of the corresponding group, i.e. $\Omega = sI$ with $s = n_1/(n_1 + n_2)$.

specific dummy variable will be neglected, a part of the unexplained part of the differential can be transferred into the explained part. Thus, the explained part can get overstated (Fortin 2008; Jann 2008; Elder et al. 2010).

In order to identify the factors that are associated with differences in facilitation ratio means among ownership types, a detailed decomposition will be provided. It is of interest which part of the differential can be attributed to particular hospital-specific or federal state-specific characteristics. For providing an accurate detailed decomposition, some methodological issues concerning the unexplained part have to be considered. First, if explanatory variables with a continuous distribution do not have natural zero points, arbitrary scaling of these variables can affect the unexplained part (see e.g. Jones 1983; Jones and Kelley 1984; Cain 1986). When a continuous variable is scaled with a constant, the results in the unexplained part will differ, since the intercept of the corresponding variable changes.

Second, the results from the detailed decomposition for categorical variables depend on the choice of the omitted category that serves as the base group (see e.g. Jones 1983; Jones and Kelley 1984; Oaxaca and Ransom 1999; Horrace and Oaxaca 2001; Gardeazabal and Ugidos 2004; Yun 2005). The coefficients for the included categorical variables quantify differences with respect to the omitted base category. The explained part of the detailed decomposition is not affected by the choice of the base category. However, the change of the base category has an influence on the results for the unexplained part, since the contribution of the categorical variable is altered as a whole. To overcome this problem, Haisken-DeNew and Schmidt (1997) recommend a transformation of the coefficients of all categorical variables in the model insofar that the sum of all single categories is restricted to zero. This transformation avoids an omitted base category, since all categories of the concerned variable will be included in the model without the occurrence of multicollinearity. However, I forgo an interpretation of the detailed decomposition for the unexplained part to avoid potential misleading inference.

The differential in facilitation ratios is decomposed for each possible pair of ownership types, i.e. *Public vs. PNFP*, *Public vs. PFP* and *PNFP vs. PFP*.[9] For each pair of ownership types three decompositions are conducted taking into account different weighting schemes for the reference vector β^*, i.e. $\beta^* = \beta_1$, $\beta^* = \beta_0$ and $\beta^* = \beta_{\text{pooled}}$.

The regression equations are estimated with pooled OLS (POLS) and fixed effects (FE). A limitation by estimating with POLS, in contrast to FE, is that unobserved heterogeneity is not taken into account. In the case of FE estimation, time-invariant factors will be eliminated. Hence, the interpretation of time-variant dummy variables differs between POLS and FE. POLS estimates of coefficients such as PNFP and PFP can be interpreted as the effect of the ownership type on the dependent variable *per se*, while the FE estimates of these coefficients are only interpretable for those hospitals that changed their ownership type towards PNFP or PFP.

[9] Decompositions are conducted with the user-written Stata command `oaxaca` provided by Jann (2008).

However, in the context of the research question, the presence of unobserved heterogeneity shall not conflict the estimation with POLS, because the decomposition separates into differences in observable and unobservable factors between ownership types.

The Blinder-Oaxaca decomposition is only provided for the POLS estimates, not for the FE estimates. Sufficient variation in the differential is necessary for the decomposition. The differential in the FE estimates does not provide enough variation to obtain reasonable decomposition results, since the majority on variation in the data is eliminated after the demeaning of the variables.[10]

5 Results

5.1 Regression results

Coefficients of POLS and FE estimations are presented in Table 2. For both, POLS and FE estimates, the EBITDA margin has a statistically significant negative influence on the facilitation ratio. On average, an increase of 1%-point in the EBITDA margin in the previous year decreases the facilitation ratio of public hospitals by 1.80%-points ($-1.798/100 = -0.01798$), holding all other variables constant. The effect for PFP hospitals is smaller (-1.33%-points) and larger for hospitals in PNFP ownership (-2.15%-points). In the FE model, the influence of the EBITDA margin decreases, but the effect remains negative and statistically significant. Hence, hospitals with a higher profitability seem to be less reliant on subsidies. This statement applies equally for all ownership types, even though the magnitude of the effect differs.

PFP hospitals exhibit a 10.1%-points lower facilitation ratio compared to public hospitals. The estimated coefficient is even higher in the FE model, but has to be interpreted differently than the POLS coefficient. Hence, when a hospital changed its ownership toward PFP the facilitation ratio is even 12.6%-points lower, all else equal. When controlling for a wide range of characteristics, the difference between public and PFP hospitals remains still substantial. Surprisingly, the size of a hospital seems to have no influence on the facilitation ratio. The membership to a hospital chain has a statistically significant effect in the group of hospitals in PFP ownership, though this negative effect is quite small. The location in rural areas also has small negative effects for PFP hospitals. The facilitation ratio depends mostly on the amount of paid subsidies in the corresponding federal state. Thus, the higher the amount of granted subsidies per general hospital bed has been in the previous year the higher the level of subsidies in the hospitals' capital stock, irrespective of the ownership type.

[10] FE estimates were also decomposed by the author. All decomposition results of the FE model were close to zero as the differential itself was near zero. Consequently, decomposing FE models is not reasonable, since the interpretation does not make much sense.

Table 2: Regression results

y = Facilitation ratio$_t$	Pooled OLS				Fixed Effects			
	All	Public	PNFP	PFP	All	Public	PNFP	PFP
EBITDA margin$_{t-1}$	-1.715^{***}	-1.798^{***}	-2.152^{***}	-1.328^{***}	-0.504^{***}	-0.686^{***}	-0.301^{**}	-0.424^{*}
	(0.174)	(0.264)	(0.238)	(0.303)	(0.108)	(0.191)	(0.153)	(0.252)
PFP	-0.101^{***}	-	-	-	-0.126^{***}	-	-	-
	(0.023)	-	-	-	(0.033)	-	-	-
PNFP	-0.005	-	-	-	-0.018	-	-	-
	(0.016)	-	-	-	(0.025)	-	-	-
Beds$_{t-1}$ $\times 10^{-3}$	0.043	0.097	0.041	0.048	-0.042	-0.073	-0.171	0.151
	(0.066)	(0.092)	(0.107)	(0.134)	(0.091)	(0.132)	(0.169)	(0.227)
Beds$_{t-1}$ $\times 10^{-3}$ squared	-0.087	-0.131^{*}	-0.094	-0.029	0.010	0.024	0.072	-0.096
	(0.058)	(0.071)	(0.100)	(0.104)	(0.057)	(0.082)	(0.102)	(0.170)
Chain member$_{t-1}$	-0.005	0.003	0.012	-0.069	-0.008	0.012	-0.019	-0.046^{***}
	(0.014)	(0.021)	(0.019)	(0.042)	(0.012)	(0.022)	(0.018)	(0.017)
Rural	-0.002	0.026	0.020	-0.070^{**}	-	-	-	-
	(0.019)	(0.031)	(0.030)	(0.029)	-	-	-	-
GDP per capita$_{t-1}$ $\times 10^{-4}$	0.012^{**}	0.018	0.006	0.014	0.001	0.013	-0.010	0.010
	(0.005)	(0.011)	(0.008)	(0.009)	(0.020)	(0.044)	(0.021)	(0.043)
Debt per capita$_{t-1}$ $\times 10^{-4}$	-0.067^{***}	-0.039	-0.092^{**}	-0.060	0.007	0.016	-0.062	-0.005
	(0.024)	(0.042)	(0.036)	(0.046)	(0.032)	(0.051)	(0.050)	(0.088)
Subsidies per hospital bed$_{t-1}$	0.132^{***}	0.100^{*}	0.121^{**}	0.157^{***}	0.016	-0.030	-0.004	0.099^{***}
	(0.033)	(0.057)	(0.051)	(0.051)	(0.020)	(0.023)	(0.031)	(0.035)
Social Democratic government$_{t-1}$	0.032^{*}	-0.003	0.041	0.080^{**}	-0.008	-0.051^{***}	-0.000	0.045
	(0.017)	(0.031)	(0.026)	(0.035)	(0.009)	(0.018)	(0.013)	(0.034)
East Germany	0.126^{***}	0.152^{***}	0.162^{***}	0.062^{**}	-	-	-	-
	(0.020)	(0.029)	(0.032)	(0.030)	-	-	-	-
2006	-0.002	0.001	0.016	-0.054	-0.011	-0.010	-0.001	-0.066^{**}
	(0.010)	(0.011)	(0.019)	(0.046)	(0.007)	(0.008)	(0.011)	(0.027)
2007	-0.011	-0.018	0.016	-0.043	-0.017^{*}	-0.022^{**}	-0.006	-0.055
	(0.012)	(0.014)	(0.020)	(0.057)	(0.009)	(0.010)	(0.014)	(0.033)
2008	-0.027^{**}	-0.038^{**}	-0.011	-0.033	-0.033^{***}	-0.041^{***}	-0.025	-0.060^{*}
	(0.012)	(0.015)	(0.021)	(0.055)	(0.010)	(0.014)	(0.016)	(0.033)
2009	-0.043^{***}	-0.050^{***}	-0.022	-0.063	-0.051^{***}	-0.056^{***}	-0.034^{*}	-0.102^{***}
	(0.013)	(0.016)	(0.020)	(0.058)	(0.010)	(0.016)	(0.018)	(0.030)
2010	-0.039^{***}	-0.048^{***}	-0.008	-0.066	-0.058^{***}	-0.057^{***}	-0.037^{**}	-0.116^{***}
	(0.014)	(0.018)	(0.021)	(0.060)	(0.010)	(0.014)	(0.017)	(0.027)
2011	-0.063^{***}	-0.073^{***}	-0.029	-0.091	-0.082^{***}	-0.079^{***}	-0.050^{**}	-0.147^{***}
	(0.015)	(0.020)	(0.020)	(0.066)	(0.013)	(0.020)	(0.020)	(0.030)
Constant	0.626^{***}	0.604^{***}	0.635^{***}	0.549^{***}	0.702^{***}	0.730^{***}	0.788^{***}	0.497^{***}
	(0.034)	(0.050)	(0.045)	(0.096)	(0.058)	(0.107)	(0.071)	(0.120)
R^2	0.328	0.240	0.249	0.234	0.175	0.189	0.112	0.246
F test	20.88^{***}	11.37^{***}	16.18^{***}	3.83^{***}	15.96^{***}	8.93^{***}	7.14^{***}	14.59^{***}
Observations	5,157	1,759	2,282	1,116	5,157	1,759	2,282	1,116
Clusters	676	249	382	84	676	249	382	84

Notes: Robust standard errors in parentheses. Clustered at balance sheet level. * p<0.10, ** p<0.05, *** p<0.01.

Political dynamics also have an influence on the facilitation ratio. When the government in the federal state changed toward the Social Democratic party in the previous year, public hospitals are associated with a 5.1%-points lower facilitation ratio. Additionally, the coefficient for PFP hospitals is statistically significant in the POLS estimation. When the federal state has had a Social Democratic government in the previous year, the facilitation ratio of PFP hospitals is 8.0%-points higher, all else equal.

The disparity between West and East Germany becomes apparent in the coefficients of the dummy variable for East Germany. Furthermore, the decrease of the facilitation ratio over time is confirmed by the coefficients of the year dummy variables.

5.2 Decomposition results

Decomposition results for all three pairs of ownership types with the weighting scheme of the pooled coefficient vector as reference vector are shown in Table 3. Tables with decomposition results for the other both weighting schemes are provided in the Appendix.[11] Each column contains a pairwise comparison of two ownership groups. The first column presents decomposition results for the pair *Public vs. PNFP*. The differential in the facilitation ratio between both ownership types is 5.2%-points. Using pooled coefficients as weights, 105.8% of the differential are explained by observable characteristics, i.e. differences in endowments explain more than the actual differential. Thus, the differential would not change significantly when both ownership types had similar endowments. The decomposition results in both other columns, containing the remaining pairwise comparisons, exhibit another pattern. The differentials for *Public vs. PFP* (21.7%-points) and *PNFP vs. PFP* (16.5%-points) are considerably higher. Differences in observable hospital-specific and federal state-specific characteristics account for 46.7% and 39.6% of the differential. Hence, when both ownership types within each pair had similar endowments, the differential in the facilitation ratio may reduce to 10.1%-points and 6.5%-points, respectively. The remaining part of the differential cannot be explained by differences in observable characteristics, but can be attributed to differences in coefficients or unobservable factors.

The bottom panel of Table 3 contains detailed decomposition results for the explained part. For all pairs, the EBITDA margin attributes significantly to the differential. Hence, differences in the profitability between ownership types account to a large extent for the difference in facilitation ratio means. Furthermore, differences in federal state-specific characteristics have an influence on the differential. In particular, debt per capita, the amount of granted subsidies per hospital bed and the disparity between West and East Germany account for the difference.

On the whole, the majority of the results is robust to the other both weighting schemes, even

[11] Since the main statements of the decomposition with all three weighting schemes for each particular pair do not differ substantially, I forgo the presentation of the other both weighting schemes in this section. Detailed decomposition results for all weighting schemes are provided in Tables A2, A3 and A4 in the Appendix.

Table 3: Decomposition results

Pair	Public vs. PNFP		Public vs. PFP		PNFP vs. PFP	
	Coef.	S. E.	Coef.	S. E.	Coef.	S. E.
$\hat{Y}_{\text{Public}}$	0.675***	(0.012)	0.675***	(0.012)		
$\hat{Y}_{\text{PNFP}}$	0.624***	(0.011)			0.624***	(0.011)
$\hat{Y}_{\text{PFP}}$			0.459***	(0.022)	0.459***	(0.022)
Total difference	−0.052***	(0.016)	−0.217***	(0.025)	−0.165***	(0.025)
Explained	−0.055***	(0.011)	−0.101***	(0.020)	−0.065***	(0.017)
	[105.77%]		[46.73%]		[39.62%]	
Unexplained	0.003	(0.016)	−0.115***	(0.024)	−0.099***	(0.023)
	[-5.77%]		[53.27%]		[60.38%]	
Detailed decomposition of the explained part						
Hospital variables						
EBITDA margin$_{t-1}$	−0.022***	(0.006)	−0.106***	(0.018)	−0.102***	(0.015)
Beds$_{t-1}$ × 10^{-3}	−0.009	(0.009)	−0.009	(0.012)	0.001	(0.003)
Beds$_{t-1}$ × 10^{-3} squared	0.016*	(0.009)	0.014	(0.009)	0.000	(0.000)
Chain member$_{t-1}$	0.001	(0.001)	−0.002	(0.003)	−0.001	(0.001)
Rural	−0.003	(0.003)	0.000	(0.001)	−0.003	(0.002)
GDP per capita$_{t-1}$ × 10^{-4}	0.003	(0.002)	0.003	(0.003)	−0.001	(0.001)
Federal state variables						
Debt per capita$_{t-1}$ × 10^{-4}	−0.012**	(0.005)	−0.002	(0.002)	0.010**	(0.004)
Subsidies per hospital bed$_{t-1}$	−0.010***	(0.004)	0.006*	(0.003)	0.020***	(0.006)
Social Democratic government$_{t-1}$	0.002	(0.002)	0.000	(0.001)	−0.004*	(0.002)
East Germany	−0.019***	(0.006)	0.004	(0.004)	0.018***	(0.006)
Year dummys						
2006	−0.000	(0.000)	0.001	(0.001)	−0.000	(0.001)
2007	−0.000	(0.000)	−0.000	(0.001)	0.000	(0.000)
2008	−0.000	(0.000)	−0.000	(0.001)	0.000	(0.000)
2009	−0.000	(0.000)	−0.002**	(0.001)	−0.001	(0.001)
2010	−0.000	(0.000)	−0.002*	(0.001)	−0.001	(0.001)
2011	−0.001	(0.000)	−0.005**	(0.002)	−0.003*	(0.002)

Notes: Pooled coefficient vector β_{pooled} used as reference vector. Robust standard errors in parentheses. Clustered at balance sheet level. * p<0.10, ** p<0.05, *** p<0.01.

though few variables in the detailed decomposition differ in their magnitude and statistical significance. In further robustness checks the dummy variable for East Germany is replaced by 15 dummy variables for the federal states in order to control for different level effects between the federal states.[12] In this model specification the shares of the explained and unexplained part change to some extent and not all continuous federal state-specific variables are statistically significant anymore. One explanation may be that the federal state dummies capture a part of the variation in the continuous variables. Nevertheless, in this modified specification differences in the profitability and in federal state-specific characteristics still account to a large amount for the differential in facilitation ratio means.

6 Conclusion

The aim of this paper was to explain differences in facilitation ratio means among the three different ownership types in the German hospital market. To reveal the driving factors that explain the differentials in the facilitation ratio, a Blinder-Oaxaca decomposition was applied.

The decomposition results show that the majority of the differential in facilitation ratios can be attributed to differences in the profitability of hospitals, measured by the EBITDA margin. Profitable hospitals are less reliant on subsidies, independent of the ownership group. Two explanations are possible: First, hospitals with a higher profitability may less often apply for subsidies according to the KHG. Second, the administration of the federal states itself may grant lower amounts of subsidies to hospitals with good financial conditions. Due to a limited budget of the federal states, the administration may rather support less profitable hospitals.

Furthermore, differences between the federal states account for a significant portion to the differential in facilitation ratios. The amount of paid subsidies per bed and debt per capita explain a part of the differential. In addition, the results indicate that political factors seem to have an influence. These findings show that there are certain factors among federal states or their administrations, which are responsible to some extent for these differentials.

So far, there is insufficient transparency in the issue of subsidies according to the KHG. The inadequate provision of investment subsidies makes the access to capital markets to a competition parameter. Hospitals with bad financial conditions face higher interests on debt capital, while profitable hospitals benefit from better access to external capital. Since the current granting regime tends to distort competition between hospitals, it gives rise to the question whether a reform of the present regime is needed. An entire re-setting on a performance-oriented granting regime may set incentives to a more competitive behavior of hospitals. Additionally, a higher degree of transparency with respect to the granting criteria can be established, since it has to

[12] The robustness checks for this model specification are provided in Tables A6 to A9 in the Appendix.

be ensured that political circumstances do not lead to a distorted allocation of subsidies. For future research an adequate data base can enable the investigation whether subsidies are used effectively and efficiently.

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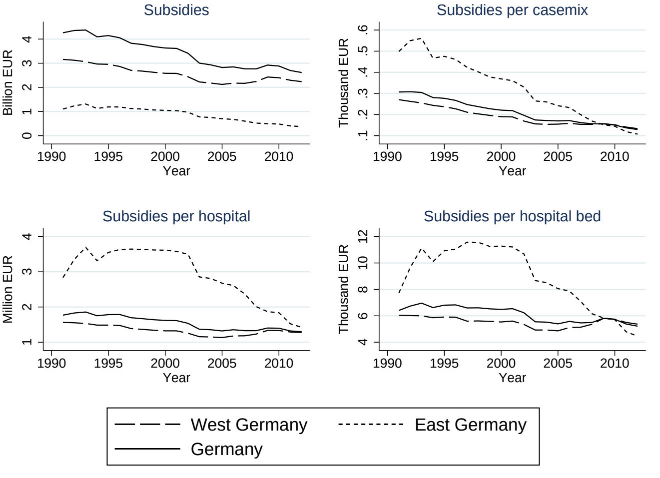
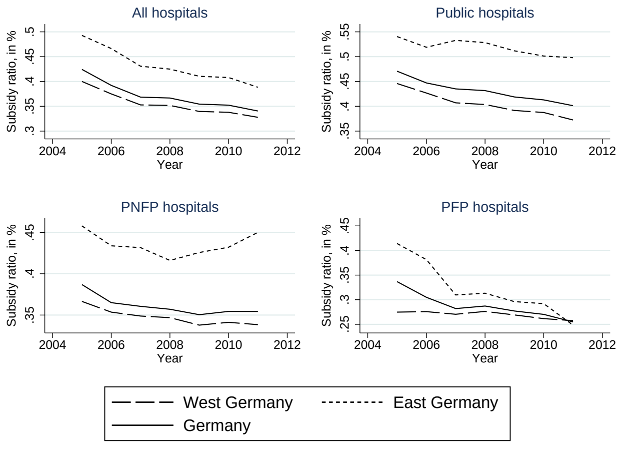
7 Appendix

Figure A1: Volume of granted subsidies for West and East Germany (price adjusted)



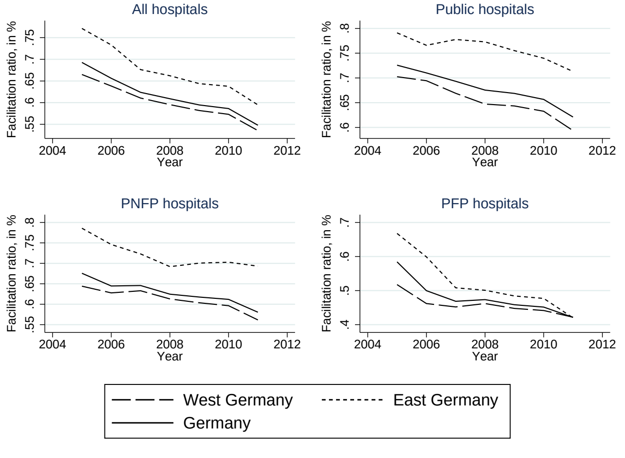
Source: DKG, Statistisches Bundesamt, WIdO. Own calculation.
Notes: Subsidies paid by federal states according to the KHG are displayed at price adjusted values. Values are price adjusted by the price index for capital goods (2012=100).

Figure A2: Ownership-specific subsidy ratios for West and East Germany



Source: Dafne, Statistisches Bundesamt. Own calculation.

Figure A3: Ownership-specific facilitation ratios for West and East Germany



Source: Dafne, Statistisches Bundesamt. Own calculation.

Table A1: Definition of variables

Variable	Definition
Hospital variables	
Facilitation ratio	Special items divided by tangible fixed assets in period t
EBITDA margin $_{t-1}$	Earnings before interest, taxes, depreciation and amortization divided by total revenues in period $t-1$
Public	1, if public hospital in period t, 0 otherwise
PNFP	1, if private not-for-profit hospital in period t, 0 otherwise
PFP	1, if private for-profit hospital in period t, 0 otherwise
Beds$_{t-1} \times 10^{-3}$	Number of hospital beds $\times 10^{-3}$ in period $t-1$
Beds$_{t-1} \times 10^{-3}$ squared	Number of hospital beds $\times 10^{-3}$ in period $t-1$ squared
Chain member$_{t-1}$	1, if the hospital is a member of a hospital chain in period $t-1$, 0 otherwise
Rural	1, if the hospital is located in a rural area, 0 otherwise
GDP per capita$_{t-1} \times 10^{-4}$	GDP per capita in EUR 10.000 on county level in period $t-1$
Federal state variables	
Debt per capita$_{t-1} \times 10^{-4}$	Public debt per capita in EUR 10.000 in the federal state in period $t-1$
Social Democratic government$_{t-1}$	1, if the federal state has a Social Democratic government in period $t-1$, 0 otherwise
Subsidies per hospital bed$_{t-1}$	Granted subsidies according to the KHG per general hospital bed in EUR 100 in the federal state in period $t-1$
East Germany	1, if East Germany, 0 otherwise
Schleswig-Holstein	1, if Schleswig-Holstein, 0 otherwise
Hamburg	1, if Hamburg, 0 otherwise
Lower Saxony	1, if Lower Saxony, 0 otherwise
Bremen	1, if Bremen, 0 otherwise
North Rhine-Westphalia	1, if North Rhine-Westphalia, 0 otherwise
Hesse	1, if Hesse, 0 otherwise
Rhineland Palatinate	1, if Rhineland Palatinate, 0 otherwise
Baden-Wuerttemberg	1, if Baden-Wuerttemberg, 0 otherwise
Bavaria	1, if Bavaria, 0 otherwise
Saarland	1, if Saarland, 0 otherwise
Berlin	1, if Berlin, 0 otherwise
Brandenburg	1, if Brandenburg, 0 otherwise
Mecklenburg Western Pomerania	1, if Mecklenburg Western Pomerania, 0 otherwise
Saxony	1, if Saxony, 0 otherwise
Saxony-Anhalt	1, if Saxony-Anhalt, 0 otherwise
Thuringia	1, if Thuringia, 0 otherwise
Year dummys	
2005	1, if year 2005, 0 otherwise
2006	1, if year 2006, 0 otherwise
2007	1, if year 2007, 0 otherwise
2008	1, if year 2008, 0 otherwise
2009	1, if year 2009, 0 otherwise
2010	1, if year 2010, 0 otherwise
2011	1, if year 2011, 0 otherwise

Table A2: Decomposition results – Public vs. PNFP

Weighting scheme	**Public coef.**		**PNFP coef.**		**Pooled coef.**	
	Coef.	S. E.	Coef.	S. E.	Coef.	S. E.
$\hat{Y}_{\text{PNFP}}$	0.624***	(0.011)	0.624***	(0.011)	0.624***	(0.011)
$\hat{Y}_{\text{Public}}$	0.675***	(0.012)	0.675***	(0.012)	0.675***	(0.012)
Total difference	−0.052***	(0.016)	−0.052***	(0.016)	−0.052***	(0.016)
Explained	−0.048***	(0.013)	−0.059***	(0.013)	−0.055***	(0.011)
	[92.31%]		[114.55%]		[105.77%]	
Unexplained	−0.004	(0.019)	0.008	(0.016)	0.003	(0.016)
	[7.69%]		[-14.55%]		[-5.77%]	
Detailed decomposition of the explained part						
Hospital variables						
EBITDA margin$_{t-1}$	−0.020***	(0.006)	−0.024***	(0.006)	−0.022***	(0.006)
Beds$_{t-1} \times 10^{-3}$	−0.012	(0.011)	−0.005	(0.013)	−0.009	(0.009)
Beds$_{t-1} \times 10^{-3}$ squared	0.018*	(0.010)	0.013	(0.014)	0.016*	(0.009)
Chain member$_{t-1}$	0.000	(0.002)	0.001	(0.002)	0.001	(0.001)
Rural	−0.003	(0.004)	−0.002	(0.004)	−0.003	(0.003)
GDP per capita$_{t-1} \times 10^{-4}$	0.004	(0.003)	0.001	(0.002)	0.003	(0.002)
Federal state variables						
Debt per capita$_{t-1} \times 10^{-4}$	−0.007	(0.008)	−0.016**	(0.007)	−0.012**	(0.005)
Subsidies per hospital bed$_{t-1}$	−0.009*	(0.005)	−0.011**	(0.005)	−0.010***	(0.004)
Social Democratic government$_{t-1}$	−0.000	(0.003)	0.004	(0.003)	0.002	(0.002)
East Germany	−0.018***	(0.006)	−0.020***	(0.007)	−0.019***	(0.006)
Year dummys						
2006	−0.000	(0.000)	−0.000	(0.000)	−0.000	(0.000)
2007	−0.000	(0.000)	0.000	(0.000)	−0.000	(0.000)
2008	−0.000*	(0.000)	−0.000	(0.000)	−0.000	(0.000)
2009	−0.000	(0.000)	−0.000	(0.000)	−0.000	(0.000)
2010	−0.000	(0.000)	−0.000	(0.000)	−0.000	(0.000)
2011	−0.001	(0.001)	−0.000	(0.000)	−0.001	(0.000)

Notes: Robust standard errors in parentheses. Clustered at balance sheet level. * p<0.10, ** p<0.05, *** p<0.01.

Table A3: Decomposition results – Public vs. PFP

Weighting scheme	**Public coef.**		**PFP coef.**		**Pooled coef.**	
	Coef.	S. E.	Coef.	S. E.	Coef.	S. E.
$\hat{Y}_{\mathrm{PFP}}$	0.459***	(0.022)	0.459***	(0.022)	0.459***	(0.022)
$\hat{Y}_{\mathrm{Public}}$	0.675***	(0.012)	0.675***	(0.012)	0.675***	(0.012)
Total difference	−0.217***	(0.025)	−0.217***	(0.025)	−0.217***	(0.025)
Explained	−0.123***	(0.024)	−0.104***	(0.028)	−0.101***	(0.020)
	[56.68%]		[47.93%]		[46.73%]	
Unexplained	−0.094***	(0.031)	−0.113***	(0.027)	−0.115***	(0.024)
	[43.32%]		[52.07%]		[53.27%]	
Detailed decomposition of the explained part						
Hospital variables						
EBITDA margin$_{t-1}$	−0.128***	(0.021)	−0.095***	(0.022)	−0.106***	(0.018)
Beds$_{t-1}$ $\times 10^{-3}$	−0.015	(0.014)	−0.007	(0.020)	−0.009	(0.012)
Beds$_{t-1}$ $\times 10^{-3}$ squared	0.018*	(0.011)	0.004	(0.014)	0.014	(0.009)
Chain member$_{t-1}$	0.000	(0.003)	−0.009	(0.007)	−0.002	(0.003)
Rural	−0.001	(0.001)	0.002	(0.003)	0.000	(0.001)
GDP per capita$_{t-1}$ $\times 10^{-4}$	0.003	(0.003)	0.002	(0.003)	0.003	(0.003)
Federal state variables						
Debt per capita$_{t-1}$ $\times 10^{-4}$	−0.002	(0.003)	−0.003	(0.003)	−0.002	(0.002)
Subsidies per hospital bed$_{t-1}$	0.004	(0.003)	0.007*	(0.004)	0.006*	(0.003)
Social Democratic government$_{t-1}$	−0.000	(0.000)	0.000	(0.003)	0.000	(0.001)
East Germany	0.006	(0.006)	0.002	(0.003)	0.004	(0.004)
Year dummys						
2006	−0.000	(0.001)	0.004	(0.004)	0.001	(0.001)
2007	−0.000	(0.000)	−0.000	(0.001)	−0.000	(0.001)
2008	−0.000	(0.001)	−0.000	(0.001)	−0.000	(0.001)
2009	−0.002**	(0.001)	−0.002	(0.002)	−0.002**	(0.001)
2010	−0.002*	(0.001)	−0.002	(0.002)	−0.002*	(0.001)
2011	−0.005**	(0.002)	−0.006	(0.005)	−0.005**	(0.002)

Notes: Robust standard errors in parentheses. Clustered at balance sheet level. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table A4: Decomposition results – PNFP vs. PFP

Weighting scheme	**PNFP coef.**		**PFP coef.**		**Pooled coef.**	
	Coef.	S. E.	Coef.	S. E.	Coef.	S. E.
$\hat{Y}_{\text{PFP}}$	0.459***	(0.022)	0.459***	(0.022)	0.459***	(0.022)
$\hat{Y}_{\text{PNFP}}$	0.624***	(0.011)	0.624***	(0.011)	0.624***	(0.011)
Total difference	−0.165***	(0.025)	−0.165***	(0.025)	−0.165***	(0.025)
Explained	−0.083***	(0.019)	−0.067***	(0.025)	−0.065***	(0.017)
	[50.30%]		[40.85%]		[39.62%]	
Unexplained	−0.082***	(0.028)	−0.097***	(0.026)	−0.099***	(0.023)
	[49.70%]		[59.15%]		[60.38%]	
Detailed decomposition of the explained part						
Hospital variables						
EBITDA margin$_{t-1}$	−0.130***	(0.018)	−0.080***	(0.019)	−0.102***	(0.015)
Beds$_{t-1}$ $\times 10^{-3}$	−0.001	(0.004)	−0.002	(0.004)	0.001	(0.003)
Beds$_{t-1}$ $\times 10^{-3}$ squared	−0.000	(0.002)	−0.000	(0.001)	0.000	(0.000)
Chain member$_{t-1}$	0.001	(0.001)	−0.004	(0.005)	−0.001	(0.001)
Rural	0.002	(0.003)	−0.007**	(0.004)	−0.003	(0.002)
GDP per capita$_{t-1}$ $\times 10^{-4}$	−0.001	(0.001)	−0.001	(0.002)	−0.001	(0.001)
Federal state variables						
Debt per capita$_{t-1}$ $\times 10^{-4}$	0.011**	(0.005)	0.007	(0.006)	0.010**	(0.004)
Subsidies per hospital bed$_{t-1}$	0.017**	(0.007)	0.021***	(0.007)	0.020***	(0.006)
Social Democratic government$_{t-1}$	−0.004	(0.003)	−0.007*	(0.004)	−0.004*	(0.002)
East Germany	0.026***	(0.007)	0.010**	(0.005)	0.018***	(0.006)
Year dummys						
2006	−0.001	(0.001)	0.004	(0.003)	−0.000	(0.001)
2007	−0.000	(0.000)	0.000	(0.001)	0.000	(0.000)
2008	0.000	(0.000)	0.000	(0.001)	0.000	(0.000)
2009	−0.001	(0.001)	−0.002	(0.002)	−0.001	(0.001)
2010	−0.000	(0.001)	−0.002	(0.002)	−0.001	(0.001)
2011	−0.002	(0.001)	−0.005	(0.004)	−0.003*	(0.002)

Notes: Robust standard errors in parentheses. Clustered at balance sheet level. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table A5: Descriptive statistics – Federal states

	All		Public		PNFP		PFP	
	Mean	St. D.	Mean	St. D.	Mean	St. D.	Mean	St. D.
Schleswig-Holstein	0.030	(0.170)	0.020	(0.142)	0.016	(0.125)	0.073	(0.260)
Hamburg	0.014	(0.117)	0.000	(0.000)	0.015	(0.123)	0.032	(0.177)
Lower Saxony	0.095	(0.294)	0.096	(0.295)	0.086	(0.281)	0.112	(0.316)
Bremen	0.012	(0.111)	0.017	(0.130)	0.012	(0.110)	0.005	(0.073)
North Rhine-Westphalia*	0.278	(0.448)	0.122	(0.328)	0.491	(0.500)	0.090	(0.286)
Hesse	0.074	(0.262)	0.091	(0.288)	0.059	(0.236)	0.078	(0.268)
Rhineland Palatinate	0.042	(0.201)	0.035	(0.183)	0.060	(0.238)	0.017	(0.129)
Baden-Wuerttemberg	0.115	(0.320)	0.172	(0.378)	0.069	(0.253)	0.121	(0.326)
Bavaria	0.120	(0.325)	0.194	(0.395)	0.034	(0.182)	0.178	(0.383)
Saarland	0.012	(0.110)	0.024	(0.154)	0.009	(0.093)	0.000	(0.000)
Berlin	0.024	(0.154)	0.000	(0.000)	0.042	(0.201)	0.027	(0.162)
Brandenburg	0.041	(0.198)	0.064	(0.244)	0.022	(0.148)	0.042	(0.201)
Mecklenburg Western Pomerania	0.019	(0.136)	0.007	(0.086)	0.015	(0.121)	0.045	(0.207)
Saxony	0.061	(0.240)	0.085	(0.279)	0.027	(0.161)	0.095	(0.293)
Saxony-Anhalt	0.029	(0.166)	0.030	(0.169)	0.025	(0.155)	0.035	(0.184)
Thuringia	0.033	(0.179)	0.042	(0.201)	0.018	(0.133)	0.050	(0.218)
Observations	5,157		1,759		2,282		1,116	

Notes: *This category of the categorical variable is used as the base category in the regression model.

Table A6: Robustness check – Regression results

y = Facilitation ratio$_t$	Pooled OLS				Fixed Effects			
	All	Public	PNFP	PFP	All	Public	PNFP	PFP
EBITDA margin$_{t-1}$	-1.706^{***}	-1.748^{***}	-2.146^{***}	-1.270^{***}	-0.504^{***}	-0.686^{***}	-0.301^{**}	-0.424^{*}
	(0.173)	(0.266)	(0.231)	(0.303)	(0.108)	(0.191)	(0.153)	(0.252)
PFP	-0.104^{***}	-	-	-	-0.126^{***}	-	-	-
	(0.023)	-	-	-	(0.033)	-	-	-
PNFP	-0.008	-	-	-	-0.018	-	-	-
	(0.017)	-	-	-	(0.025)	-	-	-
Beds$_{t-1} \times 10^{-3}$	0.044	0.055	0.030	0.093	-0.042	-0.073	-0.171	0.151
	(0.066)	(0.096)	(0.109)	(0.142)	(0.091)	(0.132)	(0.169)	(0.227)
Beds$_{t-1} \times 10^{-3}$ squared	-0.088	-0.108	-0.076	-0.063	0.010	0.024	0.072	-0.096
	(0.059)	(0.076)	(0.102)	(0.114)	(0.057)	(0.082)	(0.102)	(0.170)
Chain member$_{t-1}$	-0.007	0.004	0.008	-0.071^{*}	-0.008	0.012	-0.019	-0.046^{***}
	(0.014)	(0.021)	(0.019)	(0.041)	(0.012)	(0.022)	(0.018)	(0.017)
Rural	-0.001	0.034	0.023	-0.077^{**}	-	-	-	-
	(0.022)	(0.037)	(0.034)	(0.035)	-	-	-	-
GDP per capita$_{t-1} \times 10^{-4}$	0.010^{*}	0.018^{*}	-0.001	0.016	0.001	0.013	-0.010	0.010
	(0.006)	(0.011)	(0.008)	(0.012)	(0.020)	(0.044)	(0.021)	(0.043)
Debt per capita$_{t-1} \times 10^{-4}$	0.070	0.075	-0.038	-0.033	0.007	0.016	-0.062	-0.005
	(0.046)	(0.065)	(0.066)	(0.109)	(0.032)	(0.051)	(0.050)	(0.088)
Subsidies per hospital bed$_{t-1}$	0.032	-0.059	0.032	0.167^{***}	0.016	-0.030	-0.004	0.099^{***}
	(0.026)	(0.038)	(0.034)	(0.037)	(0.020)	(0.023)	(0.031)	(0.035)
Social Democratic government$_{t-1}$	-0.020	-0.062^{***}	-0.005	0.051	-0.008	-0.051^{***}	-0.000	0.045
	(0.013)	(0.021)	(0.018)	(0.052)	(0.009)	(0.018)	(0.013)	(0.034)
Schleswig-Holstein	0.021	0.084^{*}	-0.048	-0.024	-	-	-	-
	(0.039)	(0.048)	(0.090)	(0.060)	-	-	-	-
Hamburg	0.017	-[a]	0.139	-0.095	-	-	-	-
	(0.060)	-	(0.088)	(0.115)	-	-	-	-
Lower Saxony	-0.011	-0.006	-0.038	-0.058^{*}	-	-	-	-
	(0.024)	(0.050)	(0.032)	(0.034)	-	-	-	-
Bremen	-0.187^{**}	-0.104	-0.083	0.006	-	-	-	-
	(0.078)	(0.125)	(0.109)	(0.129)	-	-	-	-
Hesse	0.083^{***}	0.138^{***}	0.029	0.010	-	-	-	-
	(0.031)	(0.049)	(0.050)	(0.046)	-	-	-	-
Rhineland Palatinate	0.119^{***}	0.147^{**}	0.103^{**}	0.027	-	-	-	-
	(0.036)	(0.068)	(0.048)	(0.063)	-	-	-	-
Baden-Wuerttemberg	0.048	0.033	0.063	-0.040	-	-	-	-
	(0.029)	(0.044)	(0.050)	(0.055)	-	-	-	-
Bavaria	0.086^{**}	0.077	0.091^{*}	-0.039	-	-	-	-
	(0.037)	(0.062)	(0.055)	(0.069)	-	-	-	-
Saarland	-0.103	-0.175^{***}	0.059^{**}	-[a]	-	-	-	-
	(0.065)	(0.066)	(0.027)	-	-	-	-	-
Berlin	-0.051	-[a]	0.033	-0.061	-	-	-	-
	(0.065)	-	(0.080)	(0.118)	-	-	-	-
Brandenburg	0.165^{***}	0.227^{***}	0.186^{***}	-0.024	-	-	-	-
	(0.030)	(0.050)	(0.040)	(0.056)	-	-	-	-
Mecklenburg Western Pomerania	0.221^{***}	0.220^{***}	0.178^{**}	0.124	-	-	-	-
	(0.046)	(0.057)	(0.073)	(0.081)	-	-	-	-
Saxony	0.203^{***}	0.218^{***}	0.220^{***}	0.051	-	-	-	-
	(0.033)	(0.050)	(0.057)	(0.064)	-	-	-	-
Saxony-Anhalt	0.170^{***}	0.233^{***}	0.200^{***}	0.055	-	-	-	-
	(0.032)	(0.041)	(0.042)	(0.053)	-	-	-	-
Thuringia	0.158^{***}	0.214^{***}	0.215^{***}	-0.013	-	-	-	-
	(0.040)	(0.054)	(0.054)	(0.043)	-	-	-	-
Constant	0.614^{***}	0.635^{***}	0.689^{***}	0.548^{***}	0.702^{***}	0.730^{***}	0.788^{***}	0.497^{***}
	(0.038)	(0.063)	(0.049)	(0.106)	(0.058)	(0.107)	(0.071)	(0.120)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.341	0.285	0.276	0.263	0.175	0.189	0.112	0.246
F test	14.59^{***}	9.85^{***}	11.36^{***}	-[b]	15.96^{***}	8.93^{***}	7.14^{***}	14.59^{***}
Observations	5,157	1,759	2,282	1,116	5,157	1,759	2,282	1,116
Clusters	676	249	382	84	676	249	382	84

Notes: Robust standard errors in parentheses. Clustered at balance sheet level. [a]Federal state omitted due to unavailable observations. [b]The statistical program Stata does not report the F statistic for this model, not because there is something wrong with the model specification. It is not reported to be not misleading, with respect to a possible collinearity due to the majority of zero entries in the dummy variable for Bremen because only 6 observations in the sample of PFP hospitals are located in Bremen. By excluding the dummy variable for Bremen, the F statistic is 7.08^{***}. * p<0.10, ** p<0.05, *** p<0.01.

Table A7: Robustness check – Decomposition results – Public vs. PNFP

Weighting scheme	**Public coef.**		**PNFP coef.**		**Pooled coef.**	
	Coef.	S. E.	Coef.	S. E.	Coef.	S. E.
$\hat{Y}_{\text{PNFP}}$	0.624***	(0.011)	0.624***	(0.011)	0.624***	(0.011)
$\hat{Y}_{\text{Public}}$	0.675***	(0.012)	0.675***	(0.012)	0.675***	(0.012)
Total difference	−0.052***	(0.016)	−0.052***	(0.016)	−0.052***	(0.016)
Explained	−0.040**	(0.018)	−0.071***	(0.016)	−0.054***	(0.013)
	[76.92%]		[136.54%]		[103.85%]	
Unexplained	−0.012	(0.021)	0.019	(0.018)	0.002	(0.017)
	[23.08%]		[-36.54%]		[-3.85%]	
Detailed decomposition of the explained part						
Hospital variables						
EBITDA margin$_{t-1}$	−0.019***	(0.006)	−0.024***	(0.006)	−0.022***	(0.006)
Beds$_{t-1}$ × 10^{-3}	−0.006	(0.011)	−0.004	(0.013)	−0.009	(0.009)
Beds$_{t-1}$ × 10^{-3} squared	0.015	(0.011)	0.010	(0.014)	0.015	(0.009)
Chain member$_{t-1}$	0.000	(0.002)	0.001	(0.002)	0.000	(0.001)
Rural	−0.004	(0.005)	−0.003	(0.004)	−0.003	(0.003)
GDP per capita$_{t-1}$ × 10^{-4}	0.005	(0.003)	−0.000	(0.002)	0.002	(0.002)
Federal state variables						
Debt per capita$_{t-1}$ × 10^{-4}	0.013	(0.012)	−0.007	(0.012)	0.007	(0.008)
Subsidies per hospital bed$_{t-1}$	0.005	(0.004)	−0.003	(0.003)	0.002	(0.002)
Social Democratic government$_{t-1}$	−0.006**	(0.003)	−0.000	(0.002)	−0.002	(0.001)
Federal state dummies[a]	−0.040**	(0.019)	−0.041**	(0.017)	−0.042***	(0.014)
Year dummys						
2006	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
2007	−0.000*	(0.000)	−0.000	(0.000)	−0.000	(0.000)
2008	−0.001**	(0.000)	−0.000	(0.000)	−0.000**	(0.000)
2009	−0.000	(0.000)	−0.000	(0.000)	−0.000	(0.000)
2010	−0.000	(0.000)	−0.000	(0.000)	−0.000	(0.000)
2011	−0.001	(0.001)	−0.000	(0.000)	−0.001	(0.001)

Notes: Robust standard errors in parentheses. Clustered at balance sheet level. [a]Federal state dummies are grouped. * p<0.10, ** p<0.05, *** p<0.01.

Table A8: Robustness check – Decomposition results – Public vs. PFP

Weighting scheme	**Public coef.**		**PFP coef.**		**Pooled coef.**	
	Coef.	S. E.	Coef.	S. E.	Coef.	S. E.
$\hat{Y}_{\text{PFP}}$	0.459***	(0.022)	0.459***	(0.022)	0.459***	(0.022)
$\hat{Y}_{\text{Public}}$	0.675***	(0.012)	0.675***	(0.012)	0.675***	(0.012)
Total difference	−0.217***	(0.025)	−0.217***	(0.025)	−0.217***	(0.025)
Explained	−0.113***	(0.024)	−0.102***	(0.031)	−0.089***	(0.021)
	[52.07%]		[47.00%]		[41.01%]	
Unexplained	−0.104***	(0.030)	−0.115***	(0.028)	−0.128***	(0.023)
	[47.93%]		[53.00%]		[58.99%]	
Detailed decomposition of the explained part						
Hospital variables						
EBITDA margin$_{t-1}$	−0.125***	(0.021)	−0.091***	(0.022)	−0.103***	(0.018)
Beds$_{t-1} \times 10^{-3}$	−0.008	(0.014)	−0.014	(0.021)	−0.007	(0.011)
Beds$_{t-1} \times 10^{-3}$ squared	0.015	(0.011)	0.009	(0.015)	0.013	(0.009)
Chain member$_{t-1}$	0.001	(0.003)	−0.010	(0.007)	−0.002	(0.003)
Rural	−0.001	(0.002)	0.002	(0.003)	0.000	(0.001)
GDP per capita$_{t-1} \times 10^{-4}$	0.003	(0.003)	0.003	(0.003)	0.003	(0.003)
Federal state variables						
Debt per capita$_{t-1} \times 10^{-4}$	0.004	(0.004)	−0.002	(0.006)	0.005	(0.004)
Subsidies per hospital bed$_{t-1}$	−0.003	(0.002)	0.007**	(0.004)	0.001	(0.002)
Social Democratic government$_{t-1}$	−0.000	(0.002)	0.000	(0.002)	−0.000	(0.001)
Federal state dummies[a]	0.011	(0.008)	0.001	(0.009)	0.010	(0.009)
Year dummys						
2006	0.001	(0.001)	0.005	(0.003)	0.002**	(0.001)
2007	−0.000	(0.001)	−0.000	(0.001)	−0.000	(0.001)
2008	−0.000	(0.001)	−0.000	(0.001)	−0.000	(0.001)
2009	−0.002**	(0.001)	−0.002	(0.002)	−0.003**	(0.001)
2010	−0.002*	(0.001)	−0.003	(0.002)	−0.003**	(0.001)
2011	−0.006**	(0.002)	−0.006	(0.004)	−0.007**	(0.003)

Notes: Robust standard errors in parentheses. Clustered at balance sheet level. [a]Federal state dummies are grouped. * p<0.10, ** p<0.05, *** p<0.01.

Table A9: Robustness check – Decomposition results – PNFP vs. PFP

Weighting scheme	PNFP coef.		PFP coef.		Pooled coef.	
	Coef.	S. E.	Coef.	S. E.	Coef.	S. E.
$\hat{Y}_{\text{PFP}}$	0.459***	(0.022)	0.459***	(0.022)	0.459***	(0.022)
$\hat{Y}_{\text{PNFP}}$	0.624***	(0.011)	0.624***	(0.011)	0.624***	(0.011)
Total difference	−0.165***	(0.025)	−0.165***	(0.025)	−0.165***	(0.025)
Explained	−0.078***	(0.021)	−0.081***	(0.026)	−0.066***	(0.019)
	[47.60%]		[49.42%]		[40.34%]	
Unexplained	−0.086***	(0.029)	−0.083***	(0.025)	−0.098***	(0.023)
	[52.40%]		[50.58%]		[59.66%]	
Detailed decomposition of the explained part						
Hospital variables						
EBITDA margin$_{t-1}$	−0.130***	(0.017)	−0.077***	(0.019)	−0.102***	(0.015)
Beds$_{t-1} \times 10^{-3}$	−0.001	(0.004)	−0.003	(0.005)	0.001	(0.003)
Beds$_{t-1} \times 10^{-3}$ squared	−0.000	(0.002)	−0.000	(0.002)	−0.000	(0.000)
Chain member$_{t-1}$	0.000	(0.001)	−0.004	(0.005)	−0.001	(0.001)
Rural	0.002	(0.004)	−0.008*	(0.004)	−0.003	(0.002)
GDP per capita$_{t-1} \times 10^{-4}$	0.000	(0.001)	−0.002	(0.003)	−0.001	(0.001)
Federal state variables						
Debt per capita$_{t-1} \times 10^{-4}$	0.005	(0.008)	0.004	(0.013)	−0.004	(0.008)
Subsidies per hospital bed$_{t-1}$	0.004	(0.005)	0.023***	(0.006)	0.012***	(0.004)
Social Democratic government$_{t-1}$	0.000	(0.002)	−0.005	(0.005)	0.001	(0.002)
Federal state dummies^{a}	0.044***	(0.016)	−0.005	(0.018)	0.036***	(0.014)
Year dummys						
2006	0.001	(0.001)	0.004	(0.003)	0.002	(0.001)
2007	0.000	(0.000)	0.000	(0.001)	0.000	(0.001)
2008	0.000	(0.001)	0.000	(0.001)	0.000	(0.001)
2009	−0.001	(0.001)	−0.002	(0.002)	−0.002*	(0.001)
2010	−0.001	(0.001)	−0.002	(0.002)	−0.002	(0.001)
2011	−0.002	(0.002)	−0.005	(0.004)	−0.004*	(0.002)

Notes: Robust standard errors in parentheses. Clustered at balance sheet level. ^{a}Federal state dummies are grouped. * p<0.10, ** p<0.05, *** p<0.01.